Prevalence and risk of driving under influence of psychoactive substances: Results from epidemiological studies

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Publication date:
2012

Prevalence and risk of driving under influence of psychoactive substances:

Results from epidemiological studies

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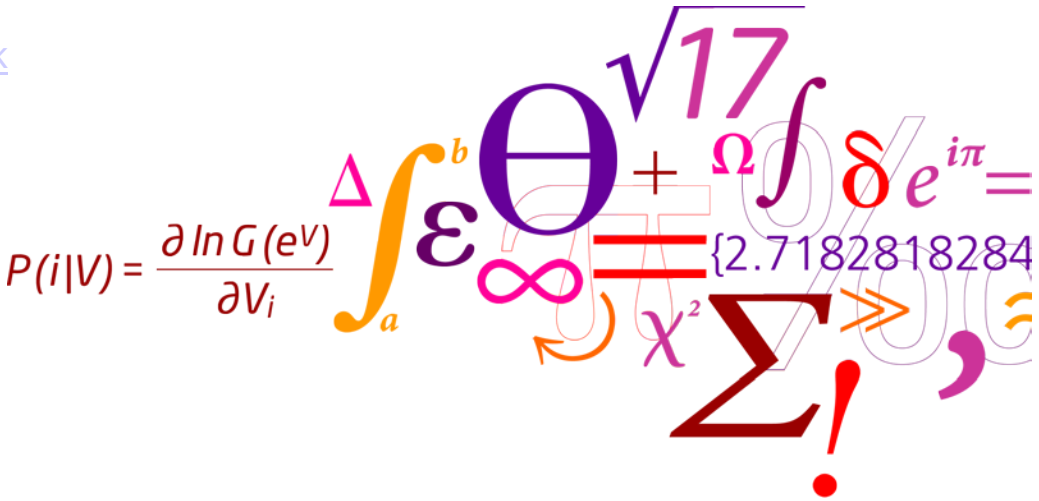
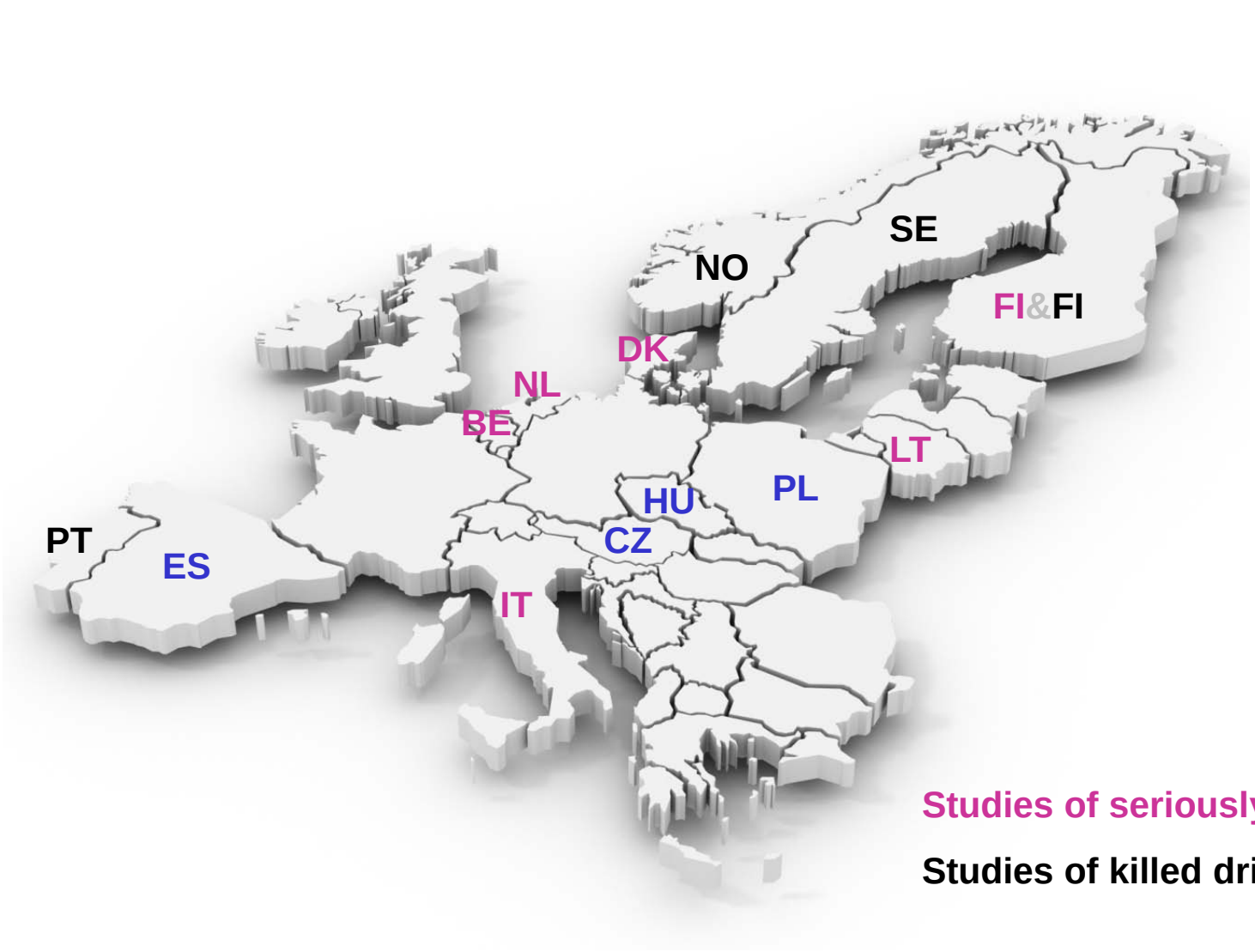


DTU Transport
Department of Transport

DRUID PROJECT - Epidemiology

- **Objectives:**
  - **To assess the situation in Europe regarding the problem of alcohol and/or other psychoactive substances in relation to road safety**
    - **Prevalence in the driving population**
    - **Prevalence in seriously injured drivers**
    - **Prevalence in killed drivers**
    - **Risk of injury for drink and/or drug drivers**

Participating countries



Studies of seriously injured drivers

Studies of killed drivers

Prevalence in the driving population

- **Alcohol and other psychoactive substances in drivers in the general traffic (Report D 2.2.3)**

Aim of the roadside surveys:

To estimate the prevalence of psychoactive substances, including alcohol in the general driving population

Method:

Roadside surveys in 13 countries by means of a uniform protocol in all countries

Prevalence in the driving population

- **Alcohol and other psychoactive substances in drivers in the general traffic**

Data collection:

Blood and/or saliva collected

Information on age, gender, place, time of the sampling ….

In total app. 50,000 drivers of passenger cars and vans

Participating countries
BE, CZ, DK, ES, FI, HU, IT, LT, NL, NO, PL, PT and SE

Samples weighted by traffic in 8 periods of the week

Psychoactive substances

The following drugs were analysed for:

Alcohol

Illicit drugs

- **Amphetamines**
- **Cocaine**
- **Cannabis**
- **Illicit opiates**
  - mainly morphine

Medicinal drugs

- **Benzodiazepines**
- **Z-drugs**
- **Medicinal opioids**

Positive concentrations were based on the same cut-offs in all studies

Equivalent cut-offs

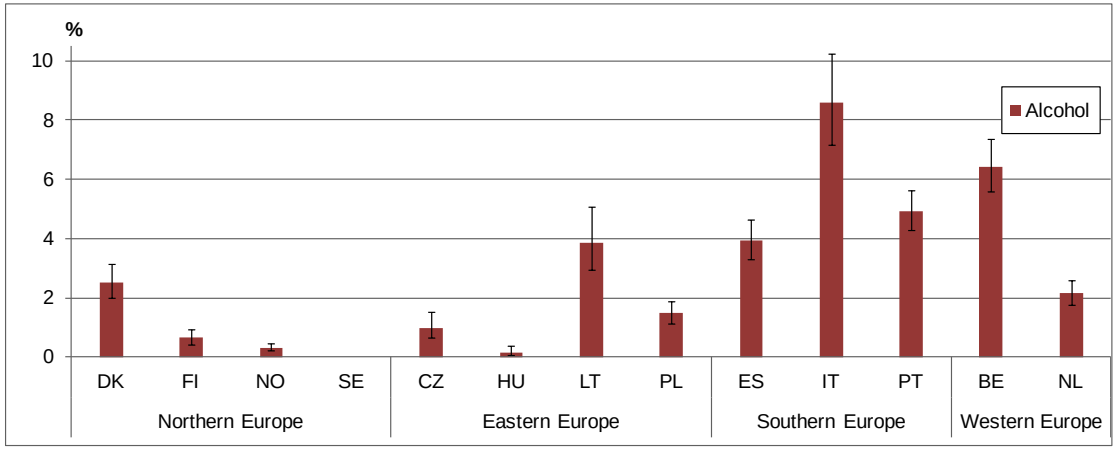
Substance	Recommended equivalent cut-off in whole blood (ng/mL)	Recommended equivalent cut-off in oral fluid (ng/mL)
Ethanol	0.1 (g/L)	0.082 (g/L)
6-AM	10	16[1]
Alprazolam	10	3.5
Amphetamine	20	360
Benzoylecgonine	50	95
Clonazepam	10	1.7
Cocaine	10	170
Codeine	10	94
Diazepam	140	5.0[2]
Flunitrazepam	5.3[1]	1.0[2]
Lorazepam	10	1.1
MDA	20	220[1]
MDEA	20	270[3]
MDMA	20	270[1]
Methadone	10	22
Methamphetamine	20	410
Morphine	10	95
Nordiazepam	20	1.1
Oxazepam	50	13
THC	1.0	27
Zolpidem	37	10[2]
Zopiclone	10	25[1]
Tramadol	50	480
7-amino-clonazepam	1.0	3.1[1]
7-amino-flunitrazepam	8.5[1]	1.0[2]

Body fluid collected:

1. Saliva
2. Blood
3. Both

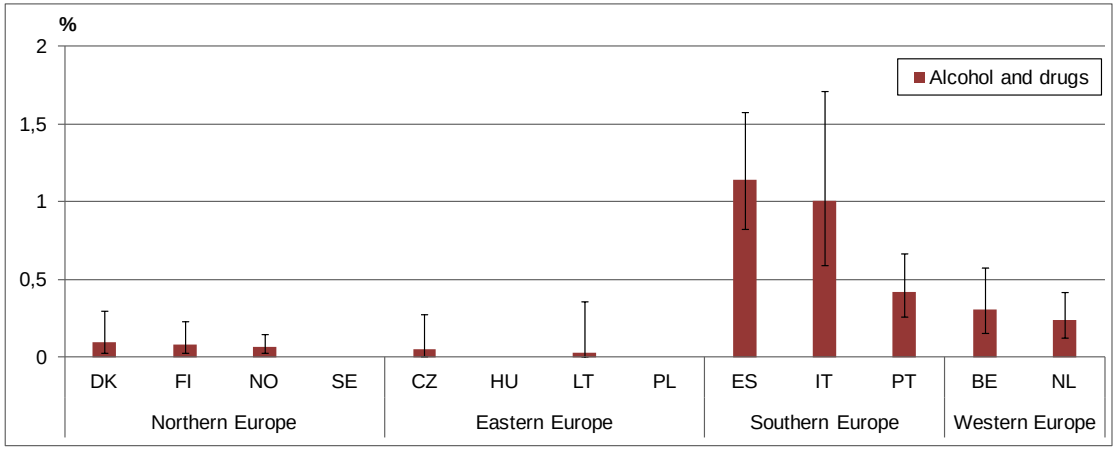
Prevalence in the driving population

Alcohol



Prevalence of alcohol

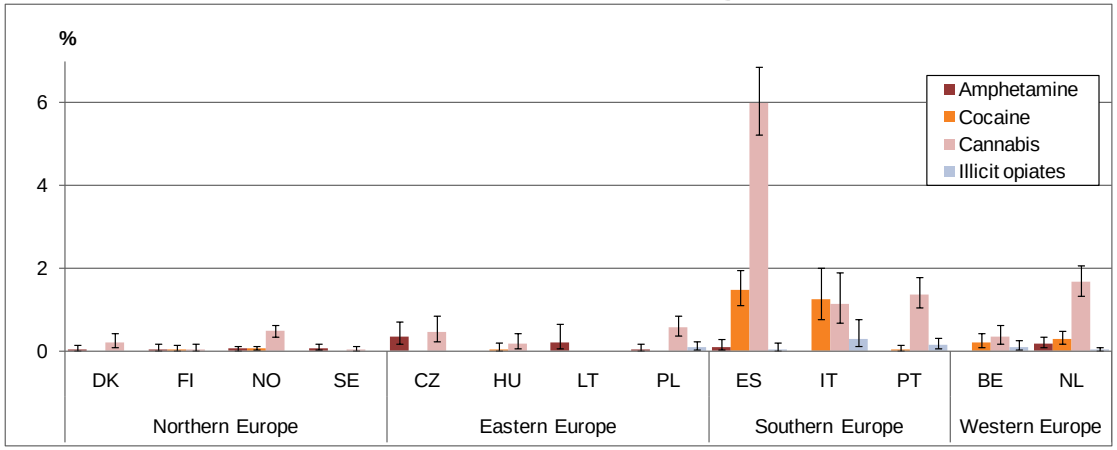
Prevalence of alcohol in combination with other drugs



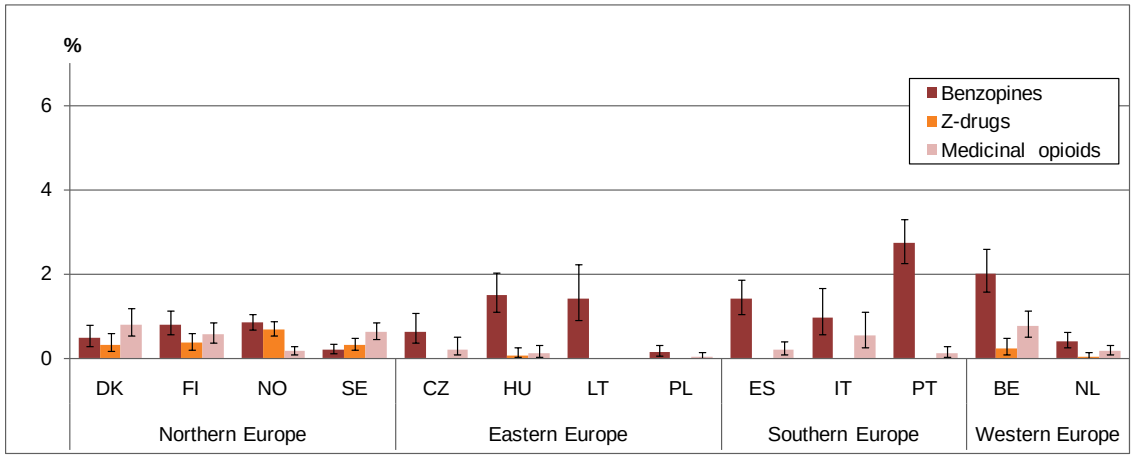
Alcohol is still the most prevalent substance in the driving population
- but most of the drink driving was with concentrations below 0.5 g/L

Prevalence in the driving population

Illicit and medicinal drugs



Prevalence of illicit drugs



Prevalence of medicinal drugs

Illicit drugs are most prevalent in southern and western Europe
Driving with medicinal drugs was observed all over Europe

Prevalence in accident involved drivers

- **Alcohol and other psychoactive substances in seriously injured and killed drivers (Report D 2.2.5)**

Aim of the studies on injured drivers:

To estimate the prevalence of psychoactive substances, including alcohol in seriously injured drivers and in killed drivers from traffic accidents

Method:

Studies of patients from traffic accidents in 6 countries and studies of killed drivers in 4 countries by means of a uniform protocol in all countries

Prevalence in accident involved drivers

- **Alcohol and other drugs in seriously injured and killed drivers**

Data collection:

Blood was collected

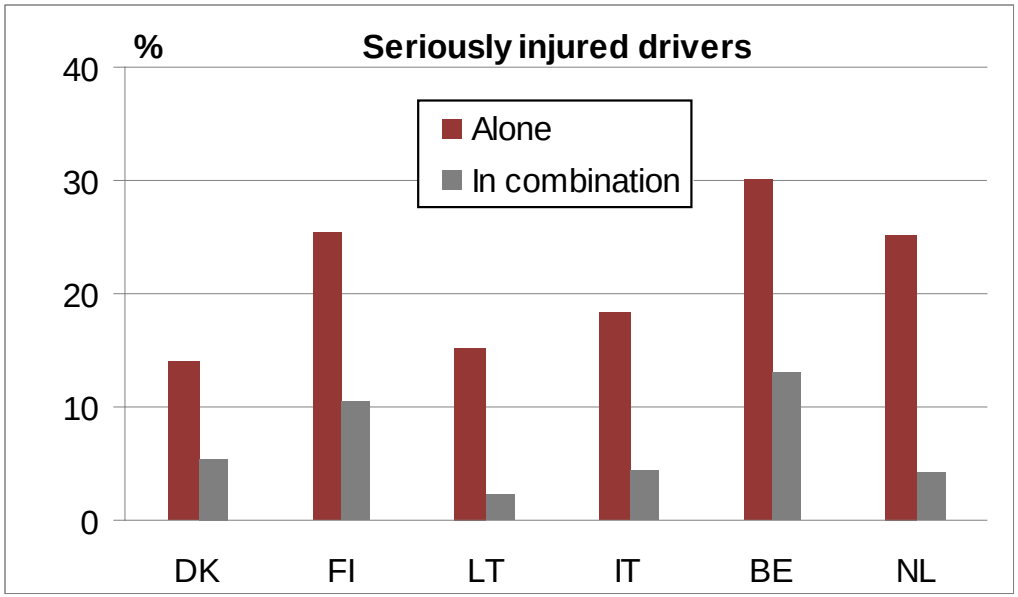
Information on age, gender, time of accident and blood sampling, place, injury severity, medical treatment.

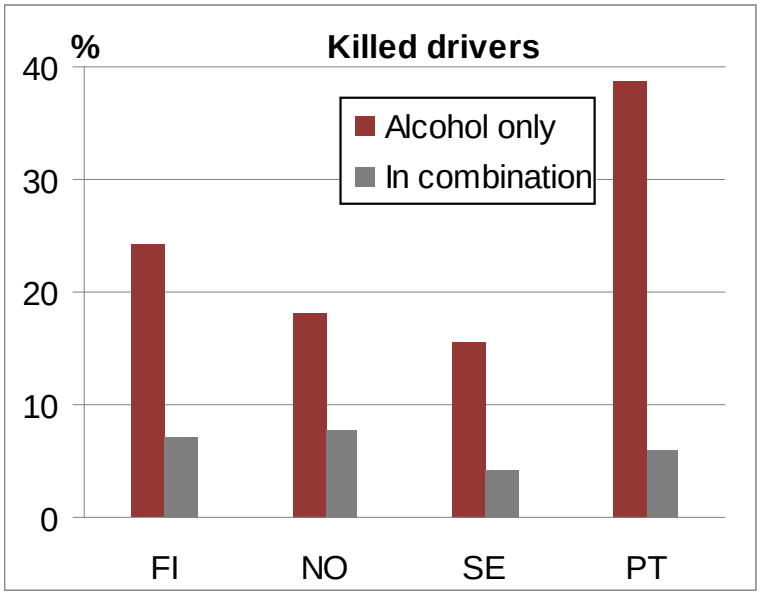
In total
- App. 2,600 seriously injured drivers
- App. 1,000 killed drivers of passenger cars and vans

Participating countries
- Seriously injured drivers from BE, DK, FI, IT, LT and NL
- Killed drivers from FI, NO, PT and SE

Prevalence in accident involved drivers

Alcohol



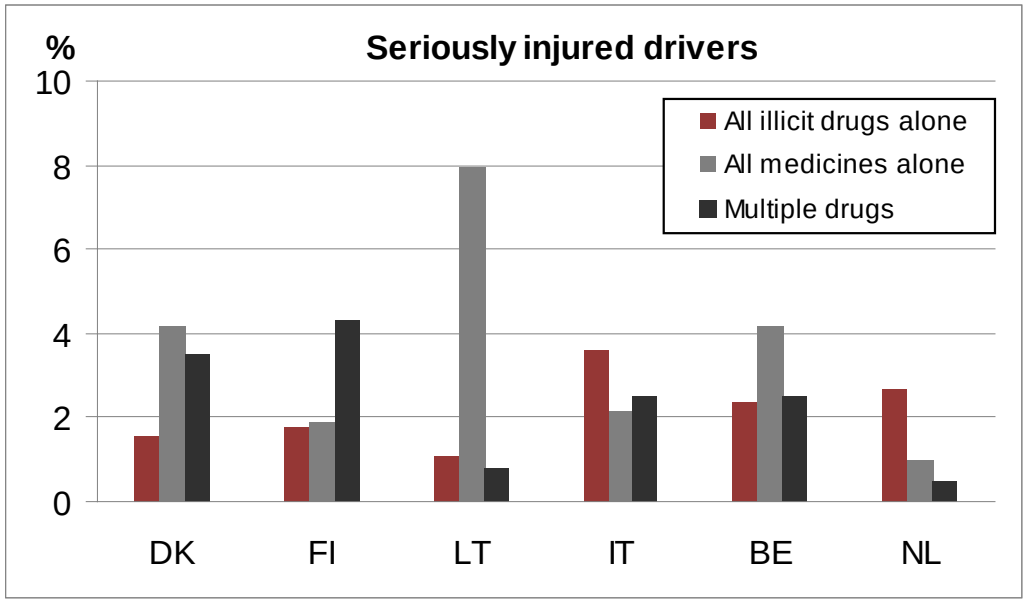


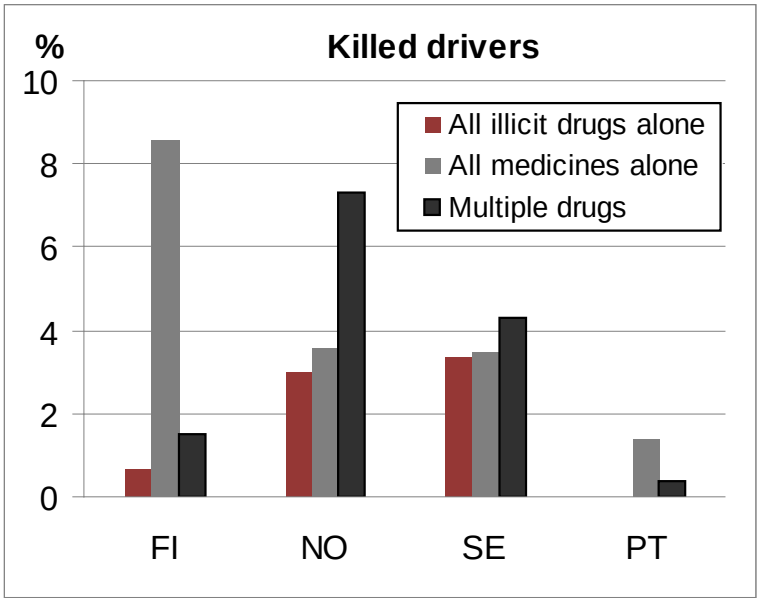
Among the alcohol positive drivers – both seriously injured and killed, the majority had a blood alcohol concentration equal to or above 0,5 g/L

Combined use of alcohol and other drugs is considerable in a number of countries

Prevalence in accident involved drivers

Illicit and medicinal drugs





For most illicit and medicinal drugs, the percentage of combined drug use exceeded that of single drug use

Risk studies

- **Risk of injury by driving with alcohol and other drugs (Report D 2.3.5)**

Method:

Case-control study based on

- **Data from seriously injured/killed drivers (cases)**
- **Data from road side surveys (controls)**

Assessment of the risk for drivers of passenger cars and vans

- **Alcohol**
- **Illicit and medicinal drugs**
- **Alcohol combined with drugs**
- **Multiple drug use**

I. Risk of serious injury

- **BE, DK, FI, IT, LT and NL**

II. Risk of fatality

- **FI, NO, PT and SE**

Risk studies

Case-control design

Cases I
Drivers of passenger cars/vans
Seriously injured (MAIS≥2)
Blood samples, N=2,490

Cases II
Drivers of passenger cars/vans
Killed in traffic
Blood samples, N=1,112

Controls
Drivers of passenger cars/vans
Stratified sample
Checked at random
Blood and saliva samples,
N= 15,832 (I)
N=21,917 (II)

Risk studies

Case-control design

The event for a driver is

- Getting injured in a road accident (acc=1) while positive (subst=1)
- Getting injured in a road accident (acc=1) while negative (subst=0).

	Cases (acc=1)	Controls (acc=0)	Sum
Exposed (subst=1)	**a**	**b**	**a+b**
Non-exposed (subst=0)	**c**	**d**	**c+d**

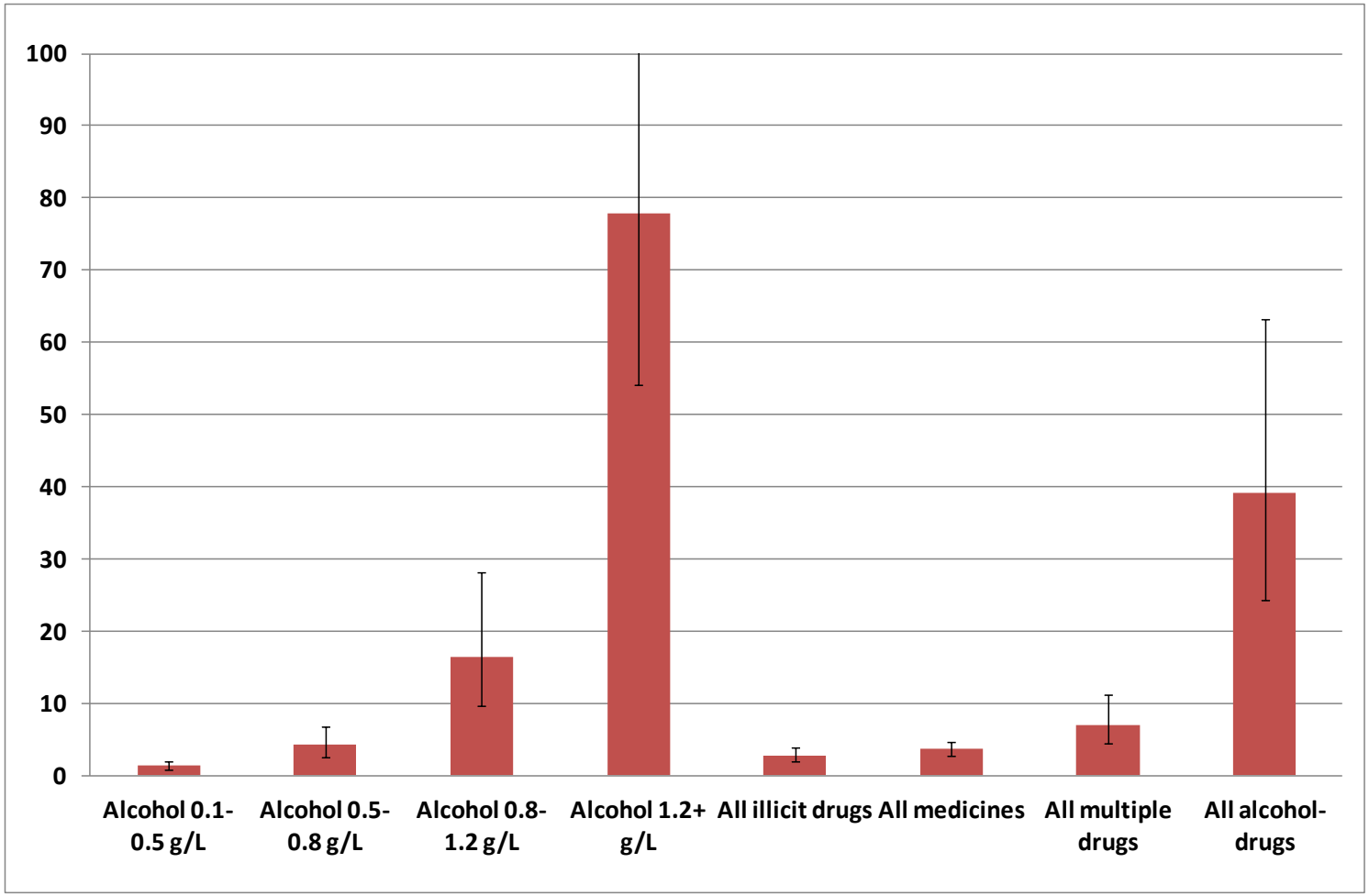
The odds ratio is a ratio between two odds

1. The odds of having the event among subjects who were positive for a given substance group (subst=1) - a/b
2. The odds of having the event among non-exposed subjects (subst=0) - c/d

Results are based on logistic regression and adjusted for age, gender and country

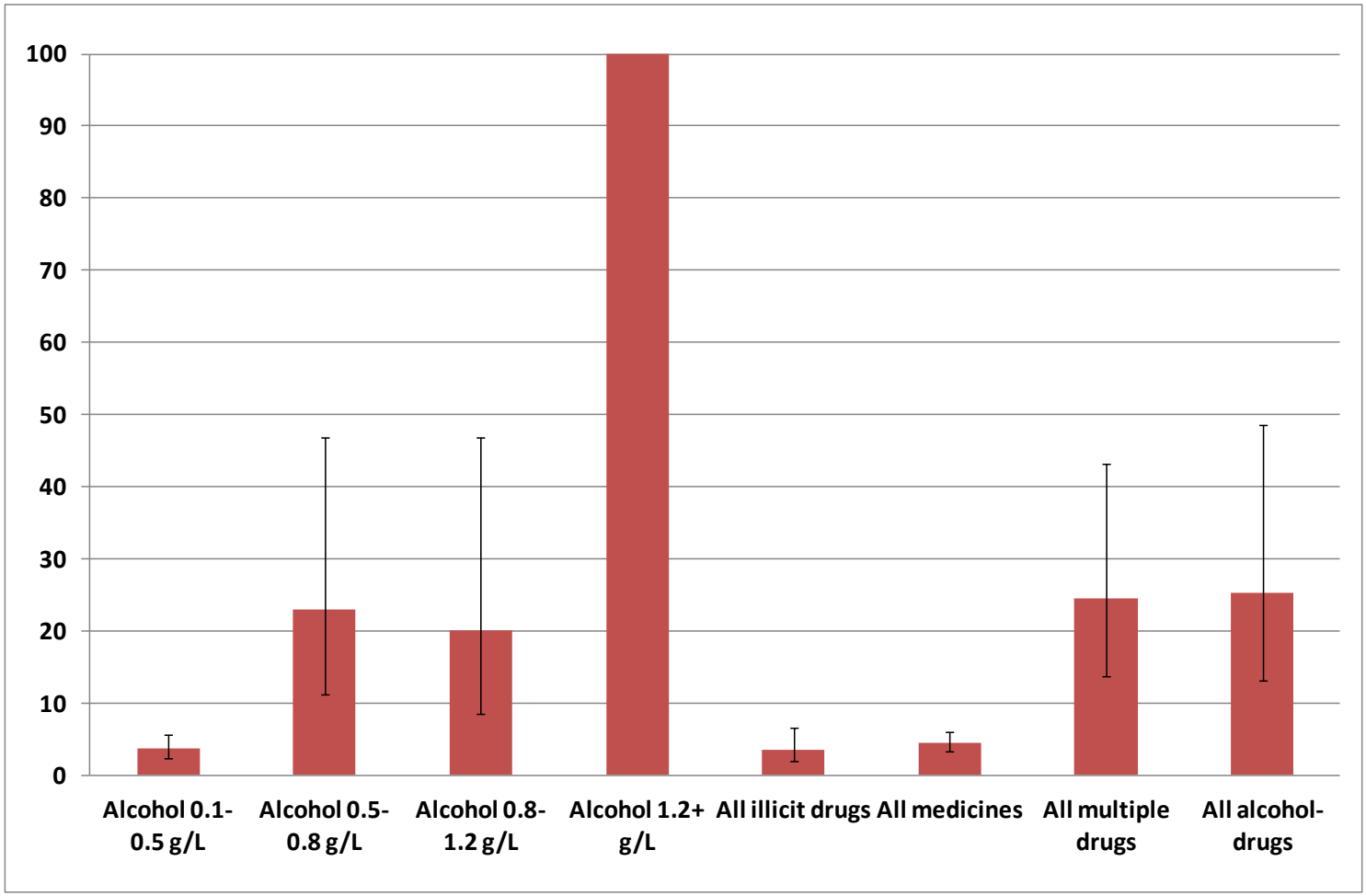
Drivers' risk of getting seriously injured

Odds ratios based on data from six countries (DK, FI, LT, IT, BE, NL)



Drivers' risk of getting killed

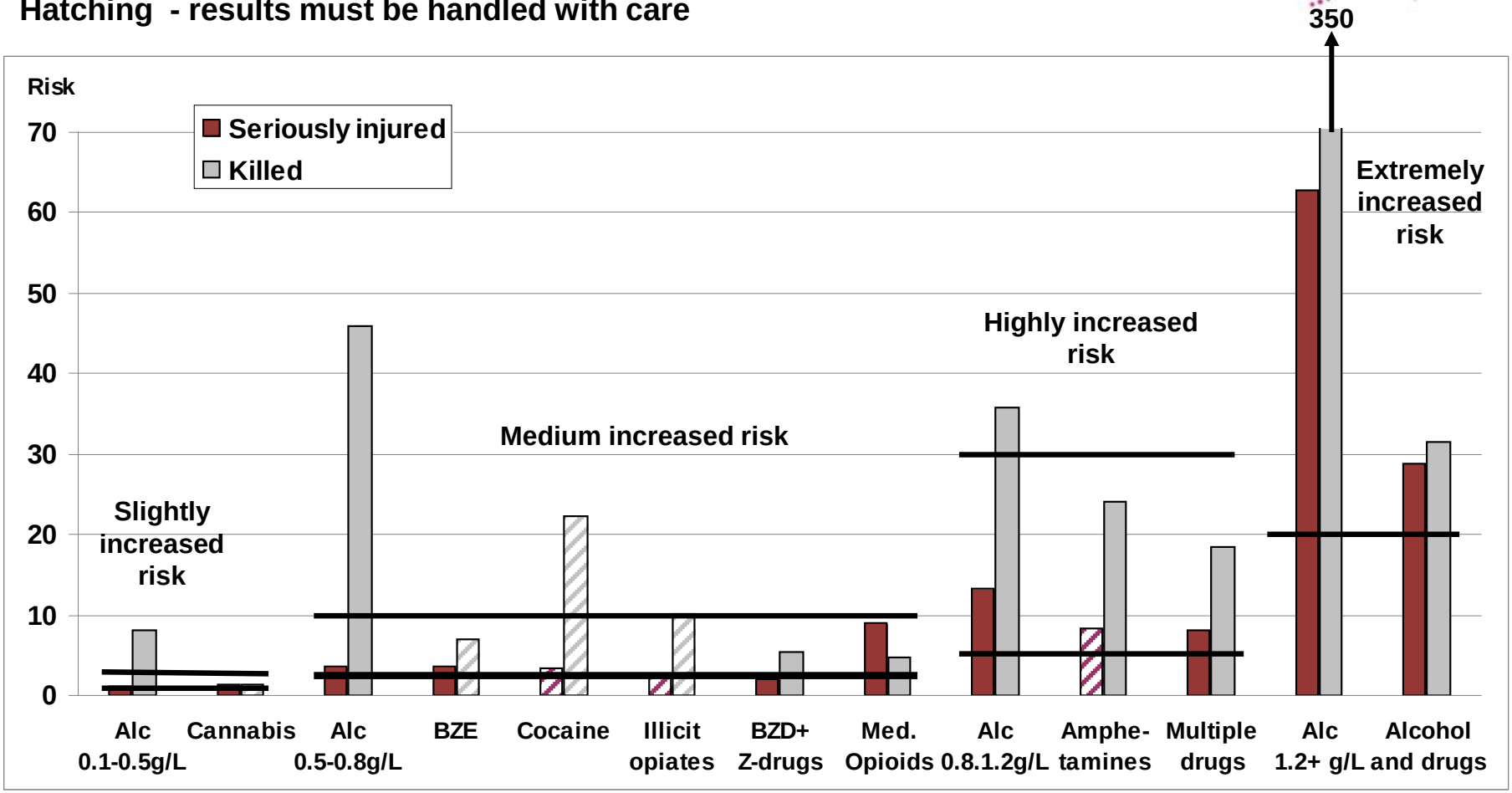
Odds ratios based on data from four countries (FI, NO, SE, PT)



Detailed risk results based on all countries

Overall risk levels

Hatching - results must be handled with care

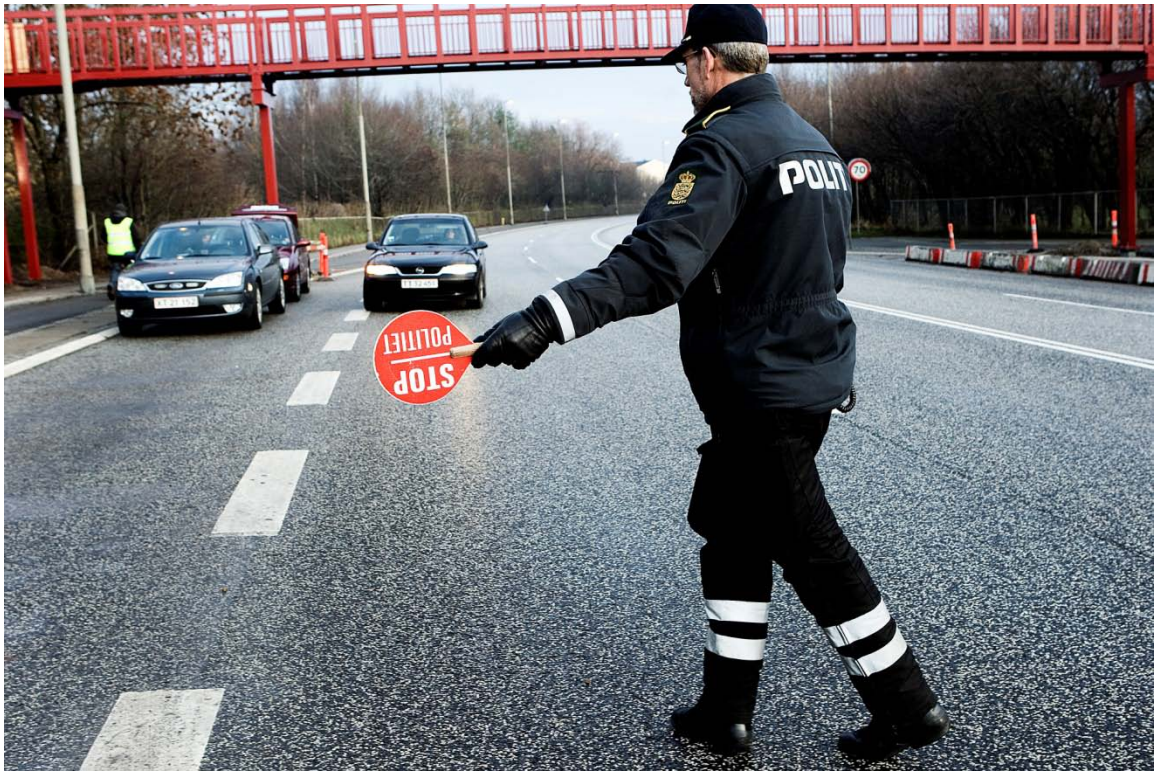


Risk studies

In conclusion -

Risk level	Risk	Substance group
Slightly increased risk	1-3	0.1 g/L ≤ alcohol in blood < 0.5 g/L Cannabis
Medium increased risk	2-10	0.5 g/L ≤ alcohol in blood < 0.8 g/L Benzoylecgonine Cocaine Illicit opiates Benzodiazepines and Z-drugs Medicinal opioids
Highly increased risk	5-30	0.8 g/L ≤ alcohol in blood < 1.2 g/L Amphetamines Multiple drugs
Extremely increased risk	20-200	Alcohol in blood ≥ 1.2 g/L Alcohol in combination with drugs

Thank you for your attention



For more information, see www.druid-project.eu